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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,933	03/30/2001	Hideyo Makino	204398US2	4152

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EXAMINER
PHAM, HAI CHI

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 04/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/820,933	MAKINO, HIDEYO	
	Examiner	Art Unit	
	Hai C Pham	2861	

-- *The MAILING DATE of this communication appears on the cover sheet with th correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,8-11,13-16 and 18-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,8-11,13-16 and 18-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claim 31 is rejected under 35 U.S.C. 102(e) as being anticipated by Hamada et al. (U.S. 6,246,463 B1).

Hamada et al teaches a multi-beam scanning apparatus comprising a light beam emitting array (51) having three light emitting points (Fig. 3) arranged in a package at an equal interval and configured to emit respective laser beams (301a-301c) that form corresponding laser beam spots on a recording medium (61, Fig. 2) at a minimum recording interval (the semiconductor laser array 51 being disposed such that the

distance between the laser beams 301a to 301c, and thus the laser beam spots 401a to 401c, to be short) (col. 6, lines 18-28), wherein the laser beams from the three laser beams scan the recording medium in a main scanning direction to form a light image having the minimum recording interval on the recording medium, and wherein any one of the laser beams (301a-301c) is used as a clock laser beam (reference beam) configured to determine a timing of starting each main scanning via the delay time setting circuit such that the beams spots (401a-401c) are aligned along the start line (610) in a direction orthogonal to the main scanning direction (Figs. 6A-6C).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4-6, 9-11, 14-16, 19-21, 23, 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. (U.S. 6,101,018) in view of Hamada et al.

Naiki et al. discloses a multi-beam scanning apparatus comprising a laser diode array (2, Fig. 6) having at least three light emitting points (2a-2f) arranged in a package at an equal interval and configured to emit respective laser beams that form corresponding laser beam spots on a recording medium (25) at a minimum recording interval (when the print mode is set to the highest density, namely at 1200 dpi as displayed in Fig. 7C), wherein the laser beams from the at least three light emitting

points scan the recording medium in a main scanning direction while being at least one of on and off (Fig. 5) so as to form a light image having the minimum recording interval in the recording medium, the equal interval is not greater than the minimum recording interval (Fig. 7C), and the at least three light emitting points are arranged such that the corresponding laser beams spots on the recording medium are arranged substantially in a line in a direction orthogonal to the main scanning direction (the laser beam spots 30a-30f corresponding to the light emitting points 2a-2f, respectively, Fig. 7C). Naiki et al. further teaches the laser beam spots configured to be arranged in a line in a distance not greater than 21.27 μm (Fig. 7C).

However, Naiki et al. fails to teach any one of the laser beams being used as a clock laser beam to determine a timing of starting each main scanning.

Regardless, Hamada et al. teaches a multi-beam scanning apparatus in which any one of the laser beams (301a-301c) is used as a clock laser beam (reference beam) configured to determine a timing of starting each main scanning via the delay time setting circuit such that the beams spots (401a-401c) are aligned along the start line (610) in a direction orthogonal to the main scanning direction (Figs. 6A-6C).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al. with the aforementioned teaching of Hamada et al. The motivation for doing so would have been to provide a simple method of aligning the scanning start positions for all laser beams emitted at one time for every scanning process while increasing the life of the semiconductor laser array, as suggested by Hamada et al.

5. Claims 3, 8, 13, 18, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al., as applied to claims 1, 2, 6, 11, 16 above, and further in view of Nakayama (JP 5-6077).

Naiki et al. in view of Hamada et al. discloses all the basic limitations of the claimed invention except for the abnormal lighting detector, and the laser beam changer configured to change the clock laser beam to any one of the laser beams in case of detected abnormality.

However, Nakayama discloses an image forming device using plural light sources, and a detecting device (29) for detecting an abnormality in the emitting state of the light sources (25) such that only normal light sources are used for forming image.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al., as modified by Hamada et al., with the aforementioned teaching of Nakayama for the purpose of adjusting the scan timing of each of the laser beams.

6. Claims 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al., as applied to claim 21 above, and further in view of Ito (U.S. 5,471,236).

Naiki et al., as modified by Hamada et al., discloses all the basic limitations of the claimed invention except for the claimed relationship, which involves the focal distances of the collimator lens and the beam-shaping lens, respectively.

However, it is well known in the art of printing that the overall lateral magnification (m) of an optical scanning device is defined as a product of the lateral magnification of the pre-deflection optical system (m_1) (comprising a collimator lens and a condenser lens) and that of the post-deflection optical system (m_2) (including the imaging lenses) as exemplified by Ito:

$$m = m_1.m_2 = (f_2/f_1).m_2$$

where, f_1 is the focal distance of the collimator lens, and

f_2 is the focal distance of the cylindrical lens.

Therefore,

$$p = L / m$$

$$= L / [(f_2/f_1).m_2]$$

$$= (f_1/f_2) . (L/m_2)$$

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the above teaching of Ito into the calculation of the scanning pitch in the device of Naiki et al., as modified by Hamada et al., since it is known in the art that such determination of the scanning pitch would include the characteristics of the pre-deflection optical system.

7. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al., as applied to claims 21, 23 above, and further in view of Kitamura (U.S. 4,393,387).

Naiki et al., as modified by Hamada et al., discloses all the basic limitations of the claimed invention except for the light beam array and the collecting element being part of a subunit.

However, Kitamura discloses a multi-beam scanning apparatus, in which the light emitting diode array (1, Fig. 2 or 15, Fig. 11) is build into a package, and is further a part of a subunit along with the condenser lens (11, Fig, 11).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al., as modified by Hamada et al., with the aforementioned teaching of Kitamura for the purpose of providing a compact laser source unit whose optical alignment would be easy to be adjusted.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al., as applied to claim 21 above, and further in view of Komatsu (U.S. 5,774,248).

Naiki et al., as modified by Hamada et al., discloses all the basic limitations of the claimed invention except for the centers of the light beam spots on the recording medium deviating less than 1/2 from a target distance between centers of the light beam spots and a line in the main scanning direction.

However, Komatsu discloses a multi-beam scanning apparatus in which the laser diode array with a plurality of light emitting points arranged at equal intervals is adjusted such that the position deviation of the vertical line connecting the centers of the light

beam spots in the sub-scanning direction is corrected, the position deviation being less than 1/2 from a target distance between centers of the light beam spots and a line in the main scanning direction (Figs. 11-12) (col. 11, lines 13-54).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al., as modified by Hamada et al., with the aforementioned teaching of Komatsu. By doing so, it is possible to correctly align the light beams in a vertical line in the sub-scanning direction as a starting point.

Response to Arguments

9. Applicant's arguments with respect to claims 1, 3-6, 8-11, 13-16, 18-31 have been considered but are moot in view of the new grounds of rejection presented in this Office action.

Additional Prior Arts

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Shimada et al. (U.S. 4,853,710) discloses the technique for aligning the scanning start positions for all laser beams in which the SOS detection is performed for one of the laser beams and phase shifts in the scanning start positions between the laser beams are corrected by delaying the scanning start timings of the corresponding laser beams.

Miura (U.S. 4,788,560) discloses a multi-beam scanning system comprising a laser diode array having two light emitting points, which are turned on/off in accordance with image data, and whose distance between the two light emitting points is not greater than the sub-scanning pitch, the system further including a detector, which detects only one of the two laser beams to determine the timing of starting each main scanning.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C Pham whose telephone number is (703) 308-1281. The examiner can normally be reached on T-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin R. Fuller can be reached on (703) 308-0079. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722, (703) 308-7724, (703) 308-7382, (703) 305-3431, (703) 305-3432 for regular communications and for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Hai Chi Pham

HAI PHAM
PRIMARY EXAMINER

April 11, 2003